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On fractional filtering versus conventional filtering in economics

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ABSTRACT

In this study, we compare the Hodrick–Prescott Filter technique with the Fractional filtering technique that has recently started to be used in various applied sciences like physics, engineering, and biology. We apply these filtering techniques to quarterly GDP data from Turkey for the period 1988:1–2003:2. The filtered series are analyzed using Minimum Square Error (MSE) and real life evidence. In the second part of the study, we use simulated data to analyze the statistical properties of the aforementioned filtering techniques.

1. Introduction

Filtering methods deal with identification and extraction of certain features from time series data, such as trend component (T_t hereafter), the cyclical component (C_t from now on), the seasonal component (S_t hereafter); and the irregular component, or noise (I_t from now on). We contribute to the existing literature on filtering techniques by comparing the Fractional filter (F hereafter) with the commonly used Hodrick–Prescott (HP from now on) filter. The Hodrick–Prescott [1] filter is used to decompose components of a macroeconomic time series and it is the most widely accepted technique in economics literature. In this paper, we investigate whether F filtering can be an alternative of HP filtering in the field of economics.

The essence of the Fractional filter is based on a procedure called "Procedure of the Optimal Linear Smoothing (POLS)". The linear smoothing property of the POLS uses the selection of the optimal value of the smoothing window based on the minimal value of the minimal error corresponding to the first local minimum [2].

In economics literature, significant amount of work has been devoted to analysis of growth and business cycles. In this context, the estimation of output gap (the difference between actual output and the trend output) is crucial. However, output gap is an unobserved variable, and thus should be estimated by the filtering techniques. For the industrialized countries, HP

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